

Electrostatic Active Space Radiation Shielding for Deep Space Missions

Ram Tripathi



The Crab Nebula and other nebulae emit space radiation that is harmful to human space travelers

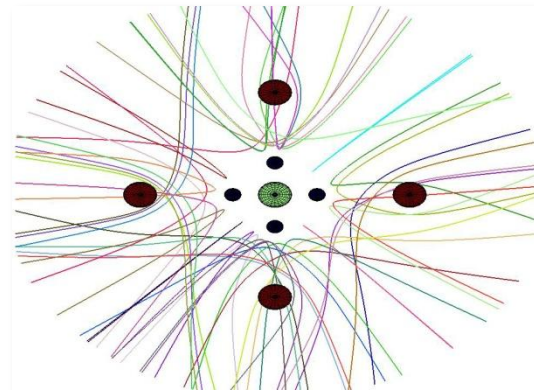
Without the advancement of radiation shielding technology, humans will never be able to travel further out into the solar system. In space, solar radiation and galactic cosmic radiation put astronauts at serious risk of damaging their health. Prolonged exposure to radiation can damage human DNA and drastically increase the risk of cancer.

In order to protect future astronauts, researchers at NASA's Langley Research Center are working on different types of radiation shielding technologies. One Research Physicist, Ram Tripathi, has been funded through NASA's Innovative Advanced Concepts (NIAC) Program to develop an electrostatic shielding system that bends radiation particles away from spacecraft.

The system concept utilizes structures that employ either a positive and negative charge. Because like charges repel, the negatively charged structures will repel negative radiation (plasma) and positively charged structures will repel positive radiation (ions). By organizing the structures in certain configurations, they can ward off radiation by creating a safe zone for a spacecraft and its crew.

"At a minimum, it's 75% more effective than the ideal material shielding, which is an enormous advantage" said Tripathi.

Through validation testing, Tripathi has proven that the concept works. He is currently looking at which configurations will work best and focusing on developing the technological aspects of the system. He has also identified gossamer as the build material for structures because it possesses many qualities that would benefit the system, most importantly, it's lightweight.



An electrostatic radiation shield would repel particles and create a safe area for astronauts

"Payload is a dictating factor. If payload is not right, if you don't get off the ground, then you aren't in business. And gossamer has been successful within NASA, so why not take advantage of that? We are here to take advantage of whatever exists, rather than re-inventing the wheel all of the time."

By coupling an active radiation shielding technology, like an electrostatic system, with other passive shielding technologies, Tripathi believes a radiation safe environment can be created for astronauts travelling into deep space. However, there is still a lot of work that needs to be done first.

"This is the golden time for radiation, everything you do here is new because nothing has been done, it's truly and exciting time."